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ON-BOTTOM AQUATIC FARMS IN SOUTHCENTRAL ALASKA

REPORT TO THE ALASKA BOARD OF FISHERIES



By

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INTRODUCTION

In October 1999 at the Alaska Board of Fisheries work session, the board requested that the department prepare information about clam farming in Alaska for presentation to the board. Proposals 400 and 401 pertain to clam farming and will be considered at the Board of Fisheries March 2000 meeting. This report provides some general background information about clam farming and aquatic farming in southcentral Alaska.

BACKGROUND

Mariculture activities in southcentral Alaska consist of oyster and mussel farms, the state's only shellfish hatchery in Seward, and a nursery facility in Halibut Cove. All the oyster and mussel farms use suspended culture methods. One on-bottom clam farm has been permitted at Tatitlek in PWS, but has never reported any production. Currently, there are 10 permitted farms in PWS and 19 in Kachemak Bay. Most of the production is from Kachemak Bay. Production from the 19 farms reporting sales in 1998 from southcentral Alaska totaled 348,436 oysters valued at \$154,420 and 4,989 pounds of mussels valued at \$13,193. Recent production is shown in Table 1.

Aquatic farming was first permitted in Halibut Cove Lagoon in 1983. The first permit was issued to culture blue mussels using rafts with suspended gear. The Alaska Department of Natural Resources (ADNR), Division of Parks and Outdoor Recreation set aside 22 acres in Halibut Cove Lagoon for mussel growout. By 1987, 11 permittees were authorized to have up to two mussel rafts in Halibut Cove Lagoon. One permit was also issued for floating gear in Jakolof Bay. In 1988, the aquatic farm statutes were enacted and regulations were developed to guide permitting by the Alaska Department of Fish and Game (ADF&G) and ADNR. Batch permit processing began with permit application materials submitted to ADNR by April 30 of any given year. Additional aquatic farmsite permits were issued for Jakolof Bay without much controversy. Then, in 1991, a number of aquatic farm applications were filed for areas where other commercial and recreational activities already occurred outside of Halibut Cove and Jakolof Bay. Three permits in Peterson Bay were initially denied by ADF&G staff because of conflicts with commercial salmon purse seine fishing, but were subsequently issued upon reconsideration by Commissioner Rosier in 1994 after they had been administratively appealed.

Farm applications received in 1992 were also controversial when farmsites were proposed adjacent to private property in Kasitsna Bay, the Herring Island Group, China Poot Bay and Halibut Cove. Private property owners and commercial set net fishers in Kasitsna Bay expressed a great deal of concern regarding effects of farms on fishing, navigation, and safety. A group known as Kachemak Bay Watch, Inc. formed to file appeals and eventually sued in State Superior Court. The superior court decision was appealed to the State Supreme Court. The controversies created by the 1991 and 1992 farm application openings resulted in closure of Peterson Bay to additional aquatic farms; closure of China Poot Bay to any aquatic farming; and closure of Kasitsna Bay to floating

farms. In addition, Commissioner Rosier requested a 3-year moratorium to provide time to consider the effects of the permitted aquatic farms on fish, wildlife and public uses of the Kachemak Bay Critical Habitat Area. The moratorium expired on December 31, 1995. The 1996 aquatic farm opening was relatively non-controversial because applications were accepted only for Bear Cove, Jakolof and Seldovia Bays. The 1997 opening was abruptly terminated when the State Supreme Court ruled in favor of Kachemak Bay Watch, Inc. The decision did a number of things, including invalidating the aquatic farmsite permits and leases that had been issued. ADNR worked with Representative Gene Therriault to add language to House Bill 109 to grandfather farmsites approved prior to 1997 providing the permittee applied for that right by the deadline established in the legislation. The legislation also changed the ADNR aquatic farming program from a permit to a leasing process. Applications for leases are accepted at least every 2 years.

The most recent aquatic farm opening was from January 1, 1999 to April 30, 1999. The applications reflected the industry's desire to diversify, increase profit margins and satisfy consumer demand by using new culture methods and requesting different species. A total of 18 aquatic farm applications were received for southcentral Alaska; six applications requested to farm only clams, seven for oysters, and the rest asked for a combination of oysters, clams, cockles or geoducks. As proposed, the clam farms would not only require a lease from DNR and an Aquatic Farm Operation Permit from ADF&G, but would also require ADF&G to issue an Aquatic Stock Acquisition Permit to transfer ownership of shellfish resources on the lease from the state to the permittee. ADF&G ultimately reviewed four applications for on-bottom clam farms from each area. The applications were evaluated against the standards in AS 16.40.105 and for consistency with the Alaska Coastal Management Program (ACMP). Kachemak Bay applications were also reviewed for compliance with the goals and policies of the Kachemak Bay and Fox River Flats Critical Habitat Areas Management Plan. Aquatic farms located in the KBCHA require a special area permit from the ADF&G Habitat and Restoration Division.

The Kachemak Bay and Fox River Flats Critical Habitat Areas Management Plan was developed by the ADF&G with full public participation and consensus on the 3 goals and 22 policies established to address resources and activities in these Critical Habitat Areas. The planning process required over two years to complete because of the public interest in protecting the resource values in the Kachemak Bay Critical Habitat Area and the contentiousness of the proposed resource development issues. The goals and policies of the plan were adopted by ADF&G and the Board of Fisheries and Game pursuant to 5 AAC 95.610. These regulations have been in place since April 1994 and are used by ADF&G in determining whether proposed activities in the critical habitat areas are compatible with the protection of fish and wildlife and their habitats, and with public use of the critical habitat areas.

EVOS Clam Restoration Project

A research project was initiated in 1995 to develop cost-effective procedures for establishing managed populations of clams for subsistence use in areas that are readily accessible from Native villages in the Exxon Valdez oil spill region. This project has been funded for 5 years by the Exxon Valdez Oil Spill (EVOS) Trustee Council. These clams are to be used for subsistence food to replace the natural clam resource that was believed to have been lost, damaged, or depleted. Project participants spoke to a decline in local clam populations possibly due to changes in beach configurations resulting from the 1964 earthquake, increasing sea otter predation, human over-harvest, and the Exxon Valdez oil spill. This project was overseen by ADF&G and subcontracted to the Chugach Regional Resources Commission (CRRC). Clams were planted in bags, under Carcover, or unprotected on beaches near the villages of Tatitlek, Nanwalek, and Port Graham in 1996, 1998 and 1999. Growth and survival of these clams has been tracked through time. Survival of unprotected clams was poor. The EVOS project ended in 1999, but CRRC has applied for grants to continue the project. They want to increase stocking levels to provide for consumptive use. Proposal 400 was submitted by CRRC to develop a process to allow an entity other than ADF&G to stock clams. The department does not have the staff or resources to assume oversight of wide spread stocking of these beaches, nor have the policies or regulations been developed to allow private stocking.

Mariculture Technical Center

In 1993, \$3.25 million was appropriated from the EVOS criminal settlement to design and build a mariculture technical center and shellfish hatchery, and conduct shellfish nursery projects in Kachemak Bay. The Mariculture Technical Center and shellfish hatchery (MTC/SH) feasibility study was completed in 1994. Construction was completed in 1998. The MTC/SH is located in Seward at the University of Alaska Institute for Marine Science site. The original plans for the MTC called for ADF&G to staff and conduct shellfish research in a portion of the facility. Operation of the hatchery component of the facility would be subcontracted. However ADF&G operational funding was reallocated in FY 96 in response to departmental budget reductions and has never been restored (Cochran 1996).

The Qutekcak Shellfish Hatchery

The Qutekcak Shellfish Hatchery has been in operation since 1993. The operation began in a small temporary facility on the Institute for Marine Science grounds in Seward, moving to the hatchery portion of the MTC/SH in 1998. The hatchery maintains brood stocks of Pacific oysters, littleneck clams, geoducks, purple hinged rock scallops and cockles. The facility has been successful in setting Pacific oyster larvae for the aquatic farm industry and has conditioned, spawned, set and raised littleneck larvae for the Clam Restoration Project (Daisy et al. 1999).

The new facility has a deep sea water intake and a state of the art effluent depuration system that allows the culture of stocks not native to the Seward area (e.g. littleneck clams, geoducks and Purple hinged rock scallops from southeast Alaska).

Kachemak Bay Shellfish Nursery Culture Research

A proposal to design, build and test a floating upwelling nursery system (FLUPSY) was funded in 1993 by the Kenai Peninsula Borough Economic Development District and the U. S. Economic Development Administration. A FLUPSY is a floating raft with culture chambers that hold bivalve seed. Seawater is pumped through the chambers. The increased water flow allows the oyster seed access to more phytoplankton and potentially increases growth rates (RaLonde and Bradley, 1999). The pilot project was so successful a production size FLUPSY was constructed in 1997 with funds from the EVOS criminal settlement. A two-year research study in 1997 and 1998 was funded by the Alaska Science and Technology Foundation. The project goals included developing a method of producing larger oyster seed and FLUPSY operational protocols to maximize oyster seed production were achieved. The FLUPSY is located in Halibut Cove and is currently operated by the Kachemak Shellfish Mariculture Association (KSMA), a shellfish growers cooperative. In the spring of 1999 clam seed was transferred from the Qutekack Hatchery, reared in the FLUPSY to a larger size, and then used in the EVOS Clam Restoration Project.

The KSMA FLUPSY is the only one currently operating in southcentral Alaska. FLUPSYS have been operated at Chenega and Tatitlek in the past and were proposed as part of three aquatic farm applications in Prince William Sound in 1999.

WHAT IS CLAM FARMING?

Littleneck clams are not currently farmed in southcentral Alaska. There are three clam farms in Southeast Alaska. Manila clam farming in Washington and British Columbia provide the model for littleneck clam farming in Alaska. Clams are the least capital intensive species to farm. The following information is taken from *Aquaculture of the Littleneck Clam* by Raymond RaLonde (undated).

Littleneck clams occur to a depth of 6 inches in the intertidal zone. Culturing clams involves substrate modification, supplementing natural spat set with hatchery seed, controlling growing density and predator control. The site selected would determine the extent of these activities.

Larger rocks and debris are removed from the site. The natural clam population is inventoried to determine the clam density, the size distribution of the standing stock and to predict the harvest. Clam population density is optimized by thinning overpopulated beaches or, if there are few small clams, the natural population may need to be supplemented with hatchery seed stock to ensure future harvests. Predators are removed from the clam bed and predator exclusion netting or bags are used to protect the clams from unacceptable mortality. Crabs, birds, flatfish, snails, sea stars octopi and sea otters all prey on clams. Plastic netting called Carcover by the industry typically has a ½" to a ¾" mesh size. Other mesh sizes can be used. It is placed on the beach and secured with rebar, rocks or by burying the edges of the mesh. If bags are used, they are partially

buried in the substrate. The effectiveness of Carcover to protect clams from sea otter predation is unknown.

Clams are harvested by hand with a hand rake on a rotational basis with each plot dug every 2 or 3 years. A tissue sample must be sent to Alaska Department of Environmental Conservation (ADEC) to test for marine toxins and the clams must be held in an ADEC approved facility until the testing is completed.

WHAT ADF&G IS DOING

Kachemak Bay/Fox River Critical Habitat Area Planning Team

The Alaska Legislature established the Fox River Flats Critical Habitat Area (CHA) in 1972 and the Kachemak Bay Critical Habitat Area in 1974. The purpose of the CHAs is to preserve habitat areas crucial to perpetuation of fish and wildlife, and restrict all uses that are not compatible with that primary purpose. In 1993, ADF&G adopted through regulation a management plan for the CHAs. The plan presents management goals for these areas and identifies policies to be used in determining whether proposed activities are compatible with protection of fish and wildlife, their habitats, and public use of the areas.

Recently, two topics have surfaced that are not specifically addressed in the plan: 1) the use of personal watercraft (e.g. Jet Skis, Sea Doos); and 2) the potential use of intertidal and subtidal areas for on-bottom commercial aquatic farming. The purpose of this planning effort is to search the literature and solicit public comments on these two topics. ADF&G will then consider the information and public input obtained in determining what, if any, course of action to take.

ADF&G established a planning team of federal, state and local agency representatives to help guide the development of the original management plan for the Kachemak Bay/Fox River Flats CHAs. This planning team approach is being used again in this most recent planning effort.

Two meetings of the planning team have been held. ADF&G and ADNR/DPOR actively solicited public comments on personal watercraft use and commercial on-bottom aquatic farming in the Kachemak Bay/Fox River Flats CHAs from November 18, 1999 through January 7, 2000. Advertisements requesting comments were placed in the Anchorage Daily News, the Homer News and the Homer Tribune, and 1,389 flyers were mailed to potentially interested parties. Written comments were accepted throughout this period and three public meetings were held. The meetings were conducted in Anchorage on December 15 and in Homer on December 16 and 17. The agencies originally intended to hold the December 16 meeting in Seldovia. However, inclement weather prevented staff from reaching Seldovia, so the meeting was restructured as a teleconference between Homer and Seldovia. This planning process is continuing.

Kachemak Bay Clam Management

In Kachemak Bay, the Board of Fisheries adopted the Southern District Hardshell Clam Management Plan (5 AAC 38.314) that described maximum harvest levels for commercial and non-commercial uses. The adoption of a management plan with an annual guideline harvest level (GHL) recognizes that the littleneck clam resource is fully utilized by existing uses in the Southern District of Cook Inlet. The maximum GHL is allocated between commercial (40,000 pounds) and noncommercial (160,000 pounds) fisheries. The commercial fishery is closed weekends from May 15 to September 15 and areas of recognized high recreational value are closed. Only ADEC certified areas on the south side of Kachemak Bay are opened to harvest. The area is divided into multiple districts that are harvested in alternate years. Proposal 401 seeks to amend this management plan and close the Southern District to hardshell clam farming.

The department conducts annual surveys to assess the littleneck clam biomass in the areas open to commercial harvest the following year. In 1999 the department extended survey coverage to include areas used by noncommercial diggers and identified in aquatic farm applications (Trowbridge et al. 2000).

Regulatory Development

The Alaska Department of Fish and Game is developing new aquatic farm regulations. These regulations are still in the internal review stage and need to be reviewed by the Department of Law and be adopted by ADF&G through the Administrative Procedures Act, which includes broad public participation.

PUBLIC COMMENTS REGARDING ON- BOTTOM AQUATIC FARMS

This past fall the ADF&G actively solicited public comments on personal watercraft use and commercial on-bottom aquatic farming in the Kachemak Bay and Fox River Flats Critical Habitat Areas (KBCHA) to assess if changes to the plan are desired to address these two issues. Both of these activities have recently become controversial and neither is addressed specifically in the KBCHA management plan. Three public meetings were held; one in Anchorage, a teleconference from Homer with Seldovia, and one in Homer. ADF&G received 188 comments, both written and verbal, concerning on-bottom aquatic farming. Overall 66% of the comments favored a ban or prohibiting on-bottom mariculture, 20% were in support, 6% preferred allowing on-bottom farming with some sort of restriction or regulation and the rest were “other” comments, such as a recommendation to conduct additional research. ADNR also held public meetings concerning the aquatic farm applications as part of the application review process. Written comments were accepted for both the ADF&G and the ADNR sponsored meetings.

The public comments indicate that the issues relating to on-bottom aquatic farming are complex and extensive. Some of these issues are specific to Kachemak Bay but others apply to on-bottom aquatic farms regardless of the location of the farm or the species cultured. The following sections summarize the major concerns expressed by the public.

Public Comment: One of the most basic concerns expressed by the public about on-bottom aquatic farms is that wild shellfish would be transferred to private ownership and the public would be denied access to those resources at the farm site. Several members of the public commented that they used the beaches in Little Jakolof, Chugachik and Bear Cove that were proposed for clam farm leases. However, others commented that clam densities were so low at the requested farm sites that removal of these beaches would not unreasonably interfere with other users.

Background: Currently, after ADNR issues the Aquatic Farm Lease and ADF&G issues an Aquatic Farm Operating Permit, ADF&G must also issue a permit to transfer ownership of the existing shellfish resources, if any, to the lessee. The transference of common property shellfish resources to private ownership through an aquatic stock acquisition permit removes the resource from possible future use by commercial, sport, personal use and subsistence users. The ADNR lease removes the beach from the possible area that commercial, personal use, subsistence and recreational harvesters may use to harvest clams.

Public Comment: The privatization of the resource will result in an exclusive fishery by the farmer when the existing wild stock is harvested.

Public Comment: Members of the public who commented in favor of on-bottom aquaculture feel the activity is constitutionally sound and that the Alaska State Legislature satisfied the Public Trust Doctrine by the passage of the Aquatic Farm Act (Section 19, Chapter 145, SLA 1988) and the adoption of related statutes. They also stated that on-bottom aquaculture can be allowed in a manner consistent with AS 16.40.120(d), 5 AAC 95.430 and 5 AAC 95.900.

Background: Article VIII, Section 3 of the Alaska State Constitution states “Wherever occurring in their natural state, fish, wildlife and waters are reserved to the people for common use.” However, Article VIII, Section 15 states “No exclusive right or special privilege shall be created or authorized in the natural waters of the State. This section does not restrict the power of the state to limit entry into any fishery for purposes of resource conservation, to prevent economic distress among fishermen and those dependent upon them for a livelihood and to promote the efficient development of aquaculture in the State.” The Alaska Department of Law has confirmed that leasing tidelands for mariculture does not violate the state constitution. However, no legal opinion exists regarding the acquisition of shellfish through a stock acquisition permit (Steve White, personal communication).

Public Comment: It appears to some that on-bottom aquatic farms violate the Sustained Yield provision of the Alaska State Constitution (Article VIII, Section 4). Some public fear that once the wild clam resource is transferred to private ownership, the state will not be able to regulate the harvest rate applied by the owner.

Background: Clam farmers have indicated that all wild clams could be harvested from a farm site eventually and a population would be maintained with hatchery clams if there is inadequate natural set. Dave Mitchell (1996), in *Broadening Alaska’s Shellfish Opportunities*, prefers to farm beaches with little or no natural recruitment because it is easier to manage the clam population. AS 16.40.120(e) states that the Board of Fisheries

may adopt regulations for the conservation, maintenance and management of species for which an acquisition permit is required. It is not clear if this statute would allow the Board of Fisheries to regulate the harvest rate of a farm or if this statute should be applied when the clams are transferred into private ownership. ADF&G may need some other mechanism to ensure sustained yield principles are followed. However, AS 16.40.120(g) states that aquatic plants and shellfish acquired under a permit issued under this section become the property of the permit holder and are no longer a public or common resource. AS 16.05.730(a) directs the state to manage fish stocks consistent with sustained yield of wild fish stocks but the state may manage for sustained yield of enhanced stocks. It is unclear how to determine when the clams on a farm cease being wild and become enhanced.

Public Comment: The public has questioned if this is a new process for allocating shellfish resources outside of the BOF process.

Background: The Aquatic Farm process differs from the Board of Fisheries process in that the farmer receives a lease to the habitat and can obtain a permit to acquire the wild stock, rather than an allocation that can be regulated by Board actions. The shellfish farmers' harvest of these resources is not bound by any Board regulations and there are no seasons, bag or size limits. The clam harvest in Kachemak Bay is currently allocated between commercial and noncommercial users. Area specific clam harvest guidelines are set by ADF&G based on estimated productivity in the available habitat. It is unclear how the allocation for an additional user group will be calculated or factored into the board allocation process, since an expanding clam farming industry would consume an increasingly larger portion of the habitat and resource. Transferring harvest opportunity to clam farmers represents a reallocation of the clam harvest between competing user groups and should be considered by the Board of Fisheries under current regulations.

Public Comment: Much public comment was received on the growth of the mariculture industry and the lack of limits on how much of the state's wild shellfish resources and habitat can be transferred to private owners through the aquatic farm program. The public speculated that although only a few applications were received this year for on-bottom farming, if those are granted, additional applications can be anticipated in the future. The public thought there was currently no method of setting limits on the number or size of farms or the amount of clams taken or evaluating the cumulative effects of this activity. Some felt there are already too many aquatic farms (suspended culture) and too many are poorly managed. Proponents of clam farming assert that the extent of clam farming will be limited in Kachemak Bay because over 90% of the south shoreline is within the state park where commercial mariculture activities are prohibited.

Background: There are no size restrictions on farms in current regulations. Nor are there regulatory limits on the number of farms that can be permitted in an area. AS 16.40.105(2) gives some guidance to ADF&G by requiring that the proposed farm may not require significant alterations in traditional fisheries or other existing uses of fish and wildlife resources; and (3) the proposed farm or hatchery may not significantly affect fisheries, wildlife, or their habitats in an adverse manner.

Currently ADF&G interprets the KBCHA Management Plan to prohibit on-bottom culture because it is incompatible with the goals and policies of the plan. Clams are not distributed uniformly throughout Kachemak Bay; only a small portion of the beaches relative to the entire shoreline support clams. Except for two mussel rafts located in Halibut Cove Lagoon, new mariculture activities are prohibited in Kachemak Bay State Park.

Public Comment: Many commented on the state's role and the state's inability to adequately regulate the mariculture industry. The public perception is that ADF&G does not have the staff or the funding to survey all potential farm sites and review farm applications for consistency with aquatic farm statutes. There is a lack of information on existing subsistence, personal use and sport harvest of shellfish and abundance and distribution of shellfish in both Kachemak Bay but especially Prince William Sound. Critical information to make informed decisions is limited or lacking. Several people suggested that ADF&G should do a better job of monitoring the existing farms and that new farms should not be considered until the cumulative effects of existing farms on natural resources was analyzed.

Background: Approximately 45 applications were received statewide for all types of mariculture projects in 1999. The ADF&G has one mariculture coordinator responsible for evaluating applications for technical feasibility and permitting aquatic farms statewide. Each region has a regional resource development biologist available to advise the mariculture coordinator on regional issues. Until 1996 the mariculture coordinator had a support staff consisting of a technician and a biologist but that funding was reallocated in response to budget reductions. No additional funding has been forthcoming. The lack of adequate staffing necessarily limits site evaluations and research. This is critical with a growing industry that is evolving into new species and gear types.

Public Comment: Farming Techniques (Predator Nets) - The use of predator nets to enhance the survival of farmed clams was controversial. Some felt that predator nets could exclude or injure sea ducks, otters and other marine life, which the critical habitat area was created to protect. Some of the waterfowl species that winter in Kachemak Bay in formerly large numbers, such as eiders and old squaws, are now depleted and may be listed as endangered in the future. One commercial fisherman noted that a salmon seine could damage predator netting and wondered if commercial fishermen could be held liable for that damage. Others noted that there is no evidence that predator netting entangle marine mammals or birds. The predator netting will be almost invisible and probably only will be applied between the +2 and -2 tidal level.

Environmental Effects - Supporters of aquatic farming said that studies have shown that clam farming causes negligible effects to the habitat and species composition of the intertidal zone. All aquatic farms require pristine water to produce a quality product and because they cannot succeed in polluted waters, they will ensure that waters remain clean. Aquatic farms are one of the most efficient and environmentally friendly coastal industries. Others commented that on-bottom culture might limit biodiversity and create a monoculture.

Clam biology - Many comments were received that mentioned a declining Kachemak Bay clam resource but opinions were divided as to what effect clam farms would have on the total abundance of the resource. Some felt that the farms would increase the available spawning stock and ultimately increase the number of clams on beaches adjacent to farmed beaches. Others felt the increased number of farmed clams may have little to do with increased recruitment; that the spawning/recruit relationship in littleneck clams was weak and since they were broadcast spawners, environmental factors were more important to the success of a spawning event.

Genetics - Closely tied to these arguments is the effect hatchery clams may have on the genetic composition of wild stocks. Some members of the public believed that hatchery clams could be maladapted to the area stocked and have a detrimental effect on other beaches because they are broadcast spawners. However, industry proponents feel that clam farming will not degrade the integrity of wild stock clams for two reasons: 1) hatchery procedures prevent deliberate genetic manipulation and the genetic composition of the hatchery seed will resemble the wild stocks from which the hatchery brood stocks were collected and 2) farmed clams will be harvested when they are 3 or 4 years old so the reproductive contribution of any individual clam will be less than a wild clam that can live over 16 years.

Background: The preceding comments regarding farming techniques (predator nets), environmental effects, clam biology, and genetic issues surrounding clam farming are taken very seriously by the department and are at the root of the need to develop a genetic and biodiversity policy targeted specifically at shellfish. Pertinent literature is currently under review by department staff as part of the KBCHA Management Plan review. This document is still in draft form but should be completed soon. Upon completion, members of the board will receive copies.

FUTURE RESEARCH NEEDS

The mariculture industry is evolving towards culturing species other than oysters and mussels. Littleneck clams are only one species the industry is interesting in farming. There is also interest in purple hinged rock scallop, geoducks and cockles. The Qutekac Shellfish Hatchery in Seward is currently investigating the feasibility of producing geoduck and scallop spat. These species were requested on applications for aquatic farm leases in PWS during this last opening. The department has taken a very conservative approach on the issue of introducing species or offspring from a distant brood stock into a region in which they don't naturally occur. It is unclear whether either purple hinged rock scallops or geoducks occur in southcentral Alaska.

Genetic and Biodiversity Policy Development

Concurrent with the evolution and growth in the industry, there is a need to develop a genetics/biodiversity policy for shellfish mariculture. Some issues that the policy must address are:

- (1) Stock transport restrictions to protect wild stocks.
- (2) Minimum brood stock size for hatchery stocks to reduce inbreeding, promote success of cultured stocks, and insure that inbred cultured stocks do not negatively

impact wild stocks.

- (3) Ecological impacts of introducing non-natives and an explanation of restrictions.
- (4) Examination of triploid development to promote the use of sterile shellfish where possible.
- (5) Identification of additional research needs.

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Table 1. Southcentral aquatic farm sales and value at point of first sale.

	Number of Farms Permitted	<u>Oysters</u>		<u>Sales</u>		Total Value
		Number	Value	Pounds	Value	
1994	41	227,777	\$ 98,652	3,063	\$ 7,158	\$ 105,810
1995	41	267,866	\$ 110,302	4,235	\$ 10,458	\$ 120,760
1996	24	253,035	\$ 107,540	6,935	\$ 13,870	\$ 121,410
1997	28	252,000	\$ 107,100	2,098	\$ 4,196	\$ 111,296
1998	28	348,436	\$ 154,420	4,989	\$ 13,193	\$ 167,613

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